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All-pass filtered x least mean square algorithm for narrowband active noise control (Article)

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Abstract

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Active noise control (ANC) is the most popular method for attenuating acoustic primary noise or disturbances by generating controllable secondary sources by which the output noise can be cancelled with the same amplitude but with opposite sign/sense. Most available ANC uses the secondary path modelling including filtered x least mean square (FxLMS) algorithm. The modelling requirement of the secondary path increases the complexity of the system implementation and decreases the control system performance. Recently several new ANC algorithms have been developed; in which there is no requirement for the modelling of the secondary path transfer function. In this regard, the aim of this paper is concerned about a narrowband feedforward ANC system in systems like air intake duct system and its novelty is to introduce all-pass filtered x LMS (APFxLMS) algorithm which do not require an estimation of the secondary path. Here first-order all pass filters with single parameter is used to improve the convergence of the LMS algorithm. The performance evaluation in terms of convergence speed of the proposed algorithm is validated with standard ANC without secondary path modelling. The results also show that the proposed method outperforms other LMS algorithm without secondary path modelling. The proposed narrowband LMS algorithm would benefit in the design of efficient feedforward ANC system that can realize noise control in air intake duct applications. © 2018 Elsevier Ltd

Author keywords

Active noise control (ANC) All-pass filtered x LMS (APFxLMS) Narrowband Secondary path

Indexed keywords

Engineering controlled terms: Acoustic variables control Active noise control Air intakes Ducts

Engineering uncontrolled terms: Active noise control (ANC) Control system performance Filtered-X least mean square algorithms Filtered-X LMS Narrow bands Performance evaluations Secondary paths System implementation

Engineering main heading: All-pass filters

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